

the low concentration impurity of the epitaxial film in the final step has an impurity concentration lower than that in the impurity doped region of the bottom and the sidewall of the trench.

30. The method according to claim 29, wherein

the vapor phase diffusion method is performed in such a manner that a dopant gas is supplied to the substrate, which is heated up to a predetermined temperature.

31. The method according to claim 30, further comprising the step of:

annealing the substrate after the step of forming the epitaxial film.

32. The method according to claim 31, wherein

the vapor phase diffusion and the final steps in the step of forming the epitaxial film and the step of annealing the substrate are successively performed in epitaxial film forming equipment.

33. The method according to claim 22, wherein

the first step is performed under a predetermined vacuum pressure lower than that of the final step.

34. The method according to claim 33, wherein

the predetermined vacuum pressure of the first step is in a range between 1000 Pa and 1×10^{-3} Pa.

35. The method according to claim 6, wherein

the step of forming the epitaxial film further includes a first step,

the first step is such that the epitaxial film having no impurity doped or an impurity doped in the epitaxial

film is formed on the bottom and the sidewall of the trench to have a predetermined thickness,

the final step is such that the epitaxial film having a high concentration impurity doped in the epitaxial film is formed to fill an inside of the trench,

the high concentration impurity of the epitaxial film in the final step has an impurity concentration higher than that in the first step, and

the final step is performed under a predetermine vacuum pressure lower than that of the first step.

36. The method according to claim 35, wherein

the epitaxial film formed in the first step is a non-dope epitaxial film.

37. The method according to claim 35, wherein

the predetermined vacuum pressure of the final step is in a range between 1000 Pa and 1×10^{-3} Pa.

38. The method according to claim 35, further comprising the step of:

annealing the substrate after the step of forming the epitaxial film.

39. The method according to claim 38, wherein

the first and the final steps in the step of forming the epitaxial film and the step of annealing the substrate are successively performed in epitaxial film forming equipment.

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